Robust Design Computational System (RDCS)

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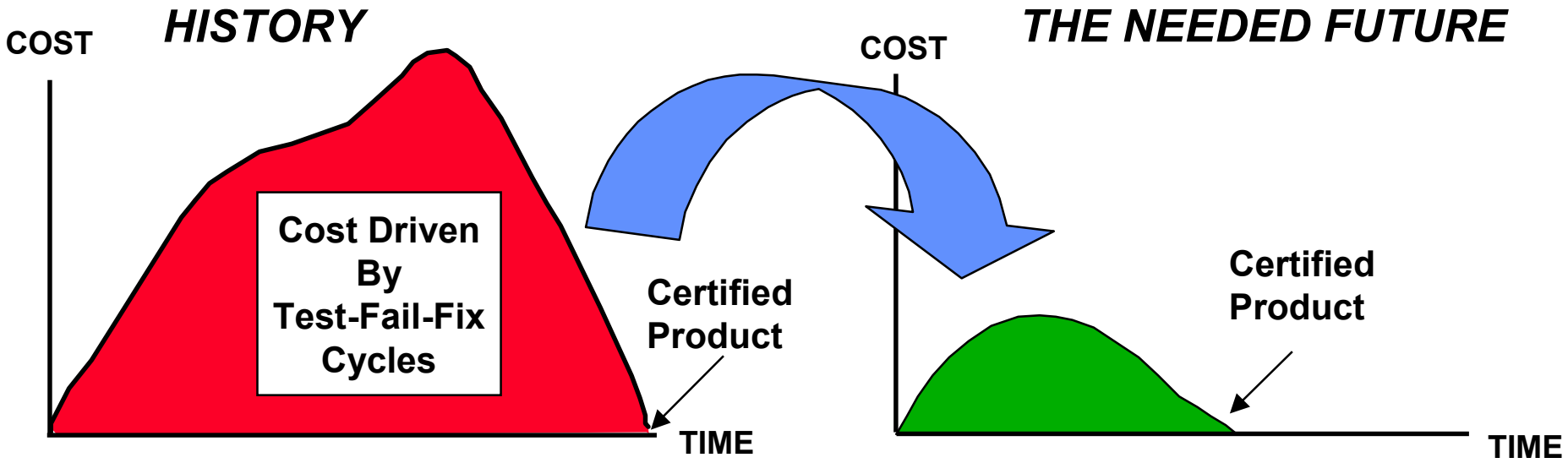
The Business Case for RDCS: Facilitate Low Cost Development



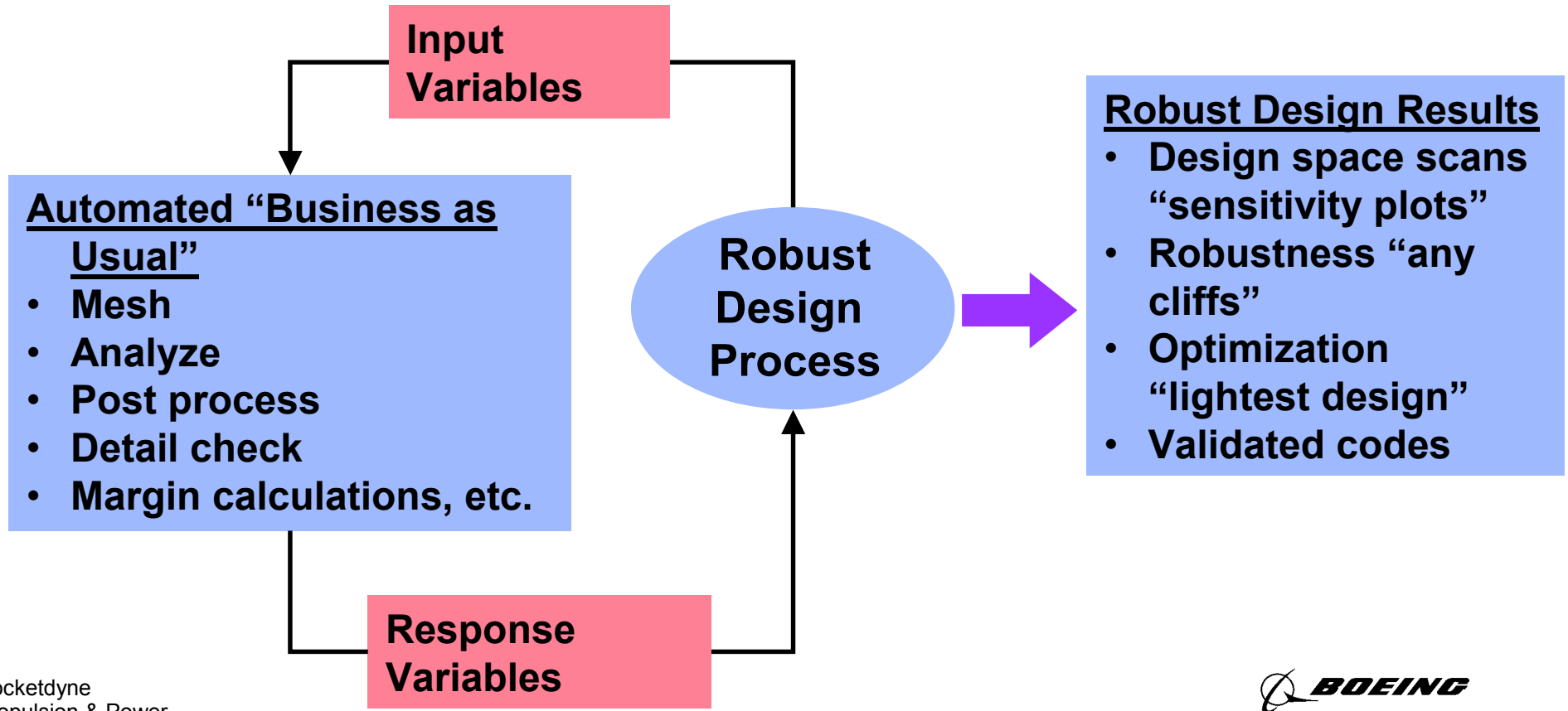
"Robust Design Computational System"

Capability Provided To:

- **Fully Explore The Design Space**
- **Account For Variabilities**
- **Quantify Risks, Sensitivities Margins, Reliabilities**

Detailed Design
Robust Design Process

Goal: Develop products insensitive to variation with an order of magnitude reduction in product development cost and cycle time.



What is RDCS?
An Enterprise Wide Computational Tool

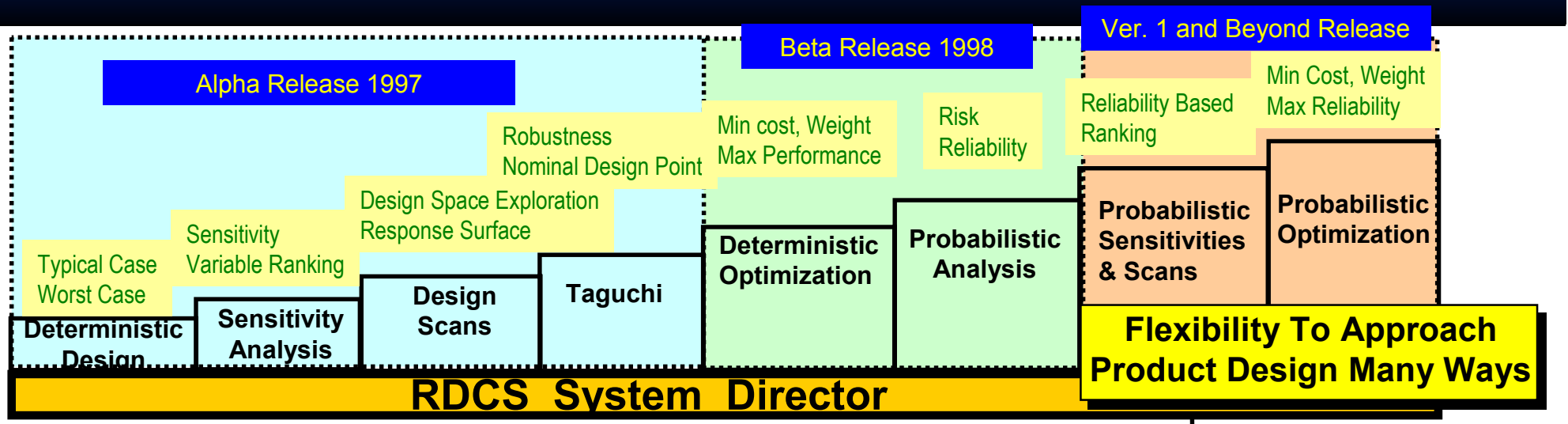
- An engineering code with built in strategies to perform standard deterministic design and advanced robust design methods such as: sensitivity quantification, design scanning, Taguchi signal-to-noise, deterministic optimization and probabilistic risk assessment

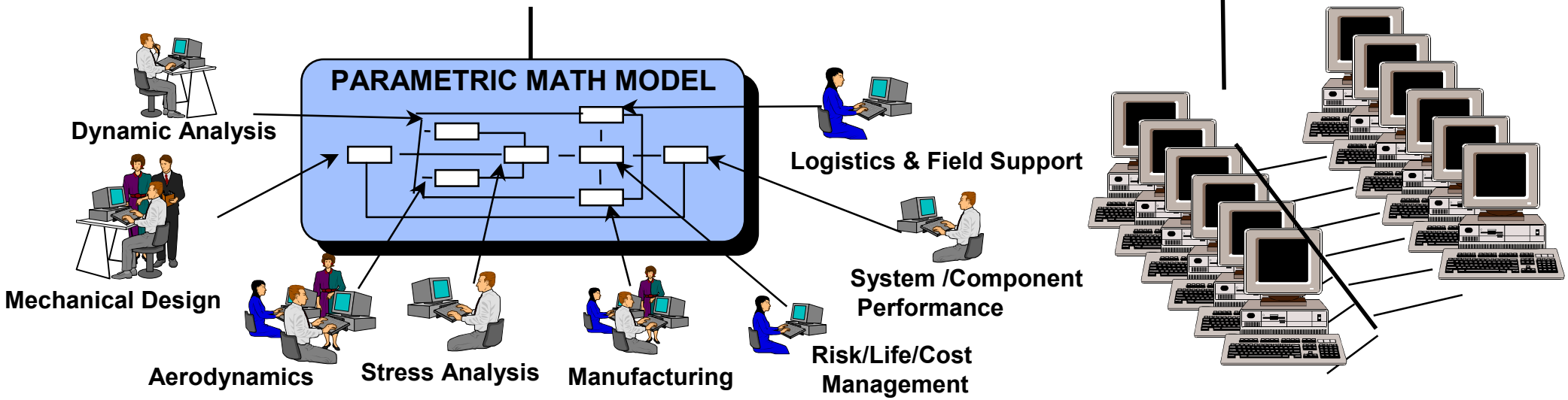
- A framework for performing automated design explorations using multi-disciplinary systems models distributed over a unix computing network

- Not just an analysis program such as finite element or discipline specific stress / thermal / fluid analysis

- A computational system that takes care of the mundane tasks of: setting up multi-disciplinary parametric analyses, running them on a network of computers, plotting the results, etc.

Robust Design Computational System

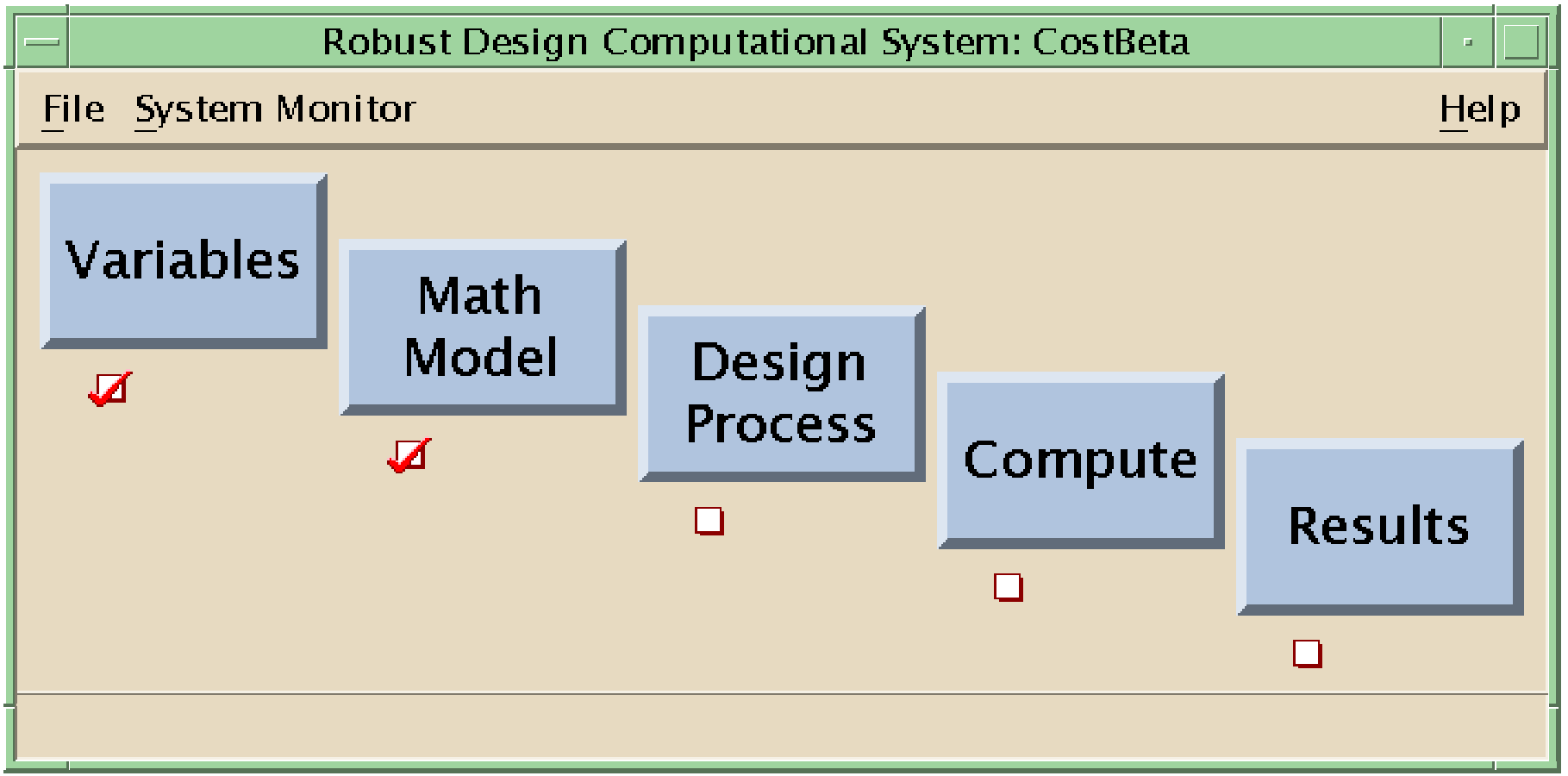




Capture analysis & design process

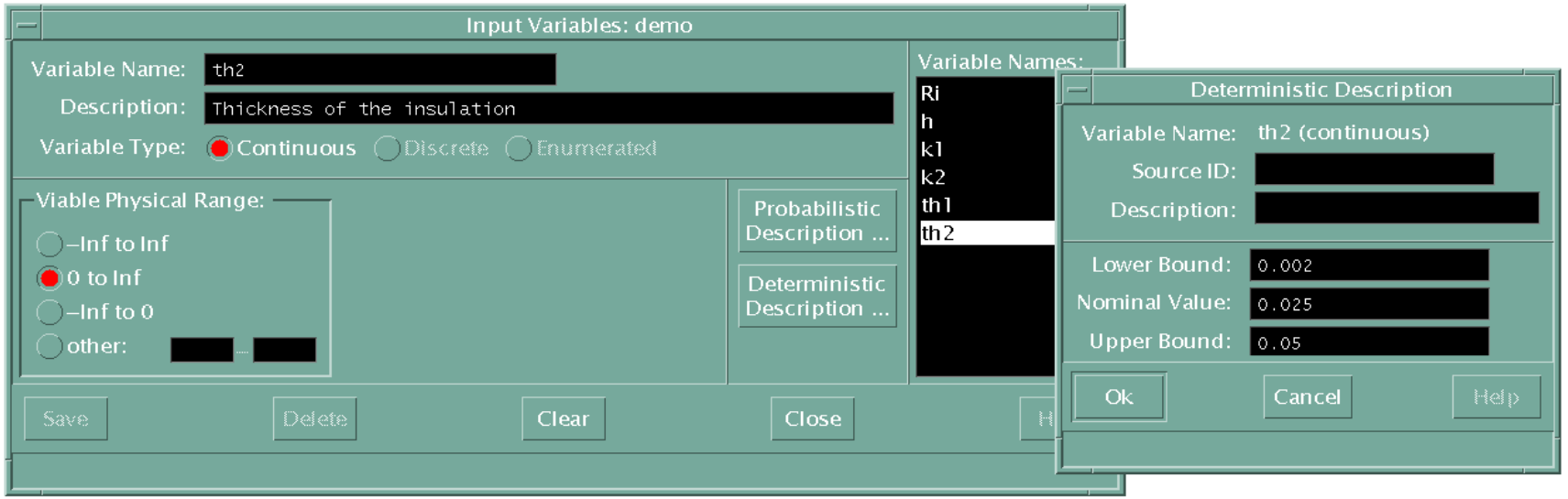
Rapid parallel computing

RDCS Workflow



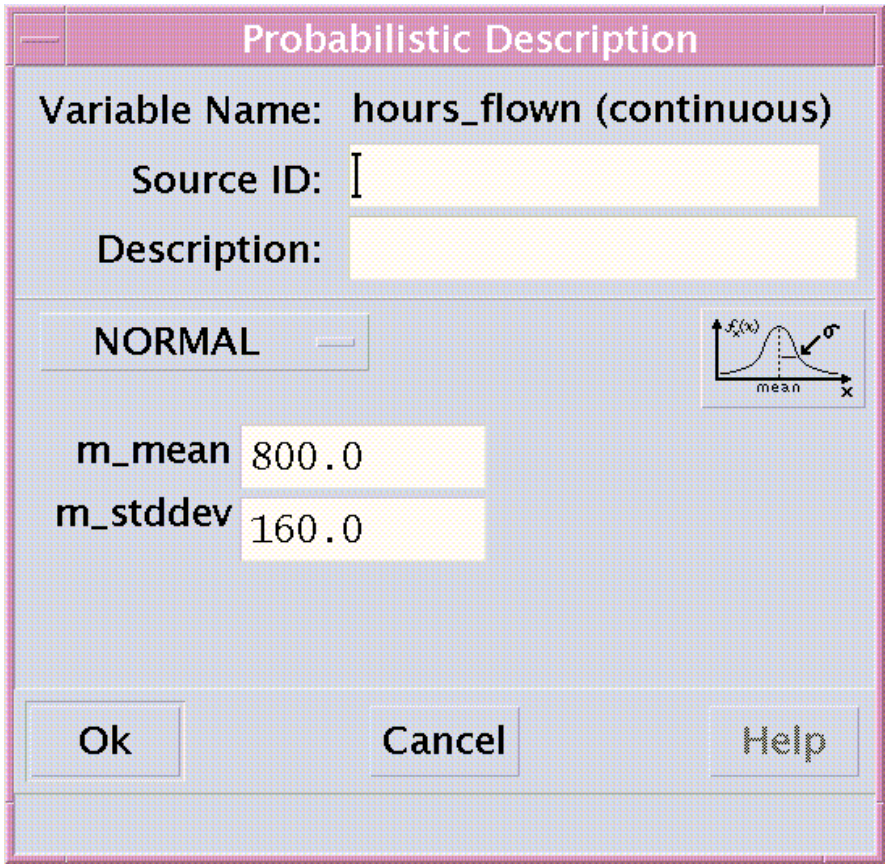
Definition of Global Variables & Responses

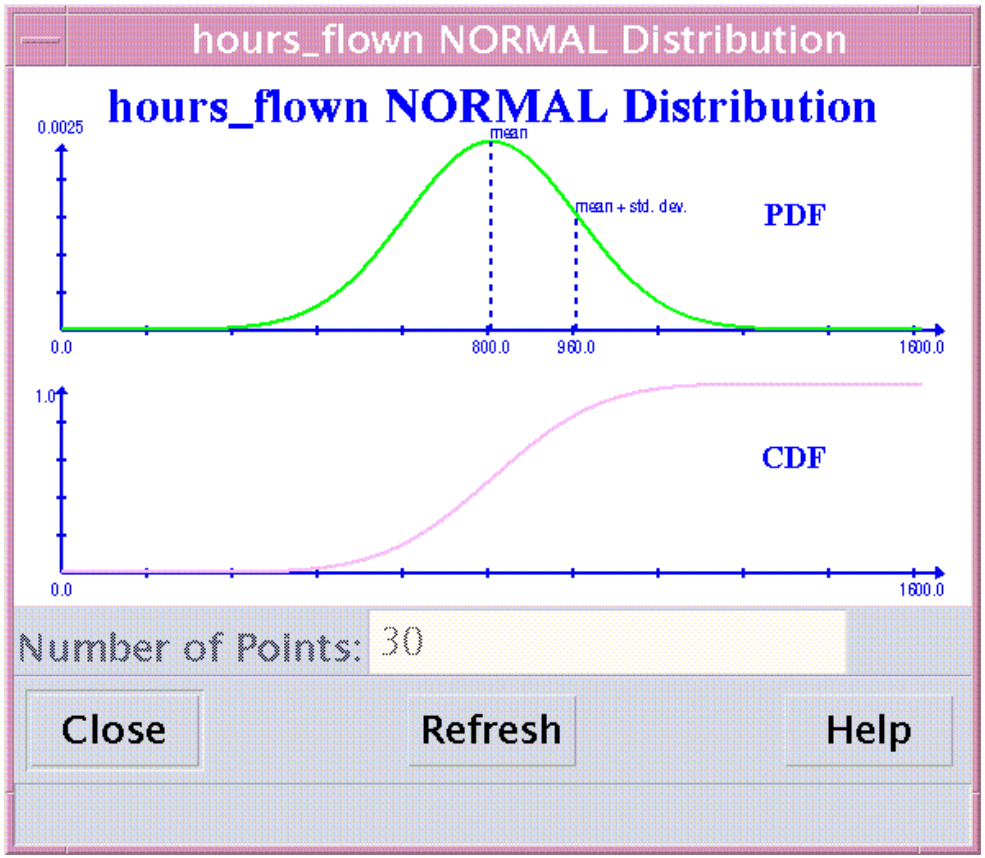
- No Repetitive or Redundant Global Variable or Response Inputs
- Same Variables & Responses are Shared by All the Design Processes



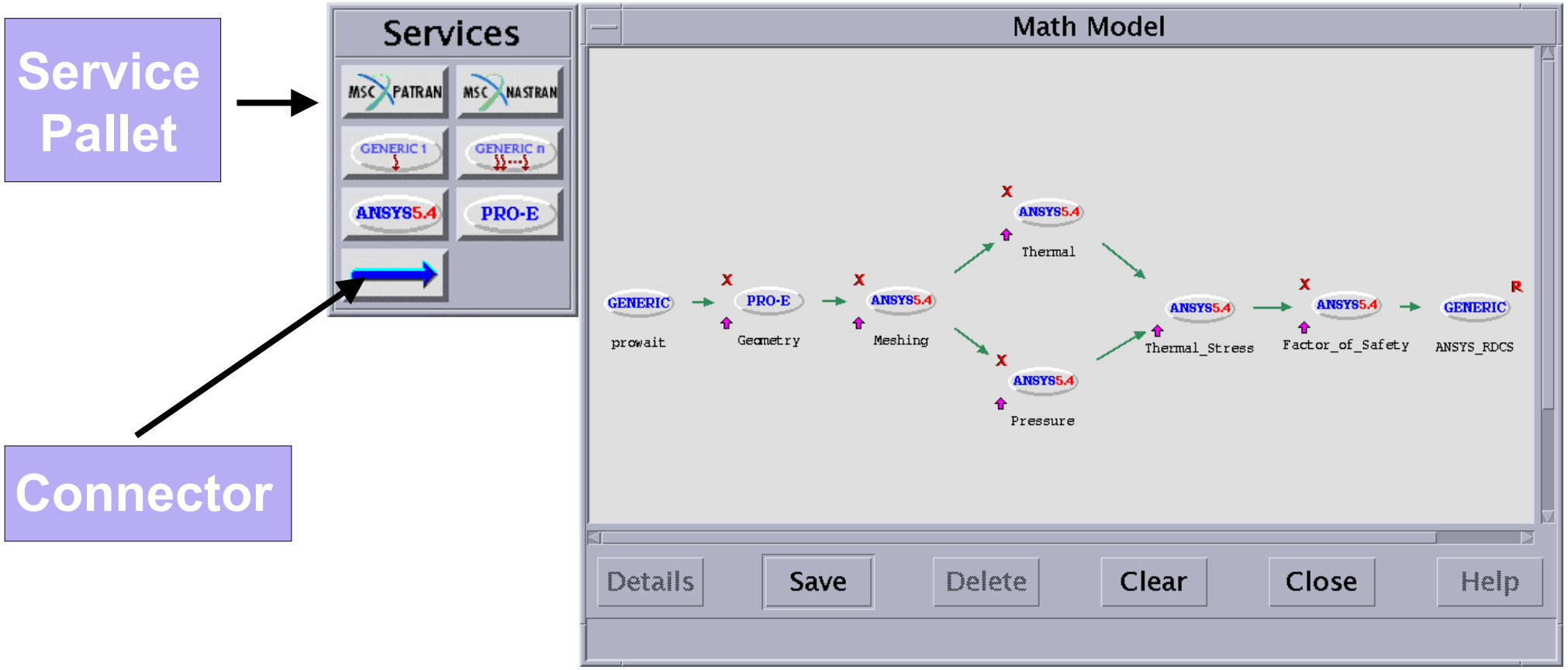
RDCS Allows Global Variables with Probabilistic Description

- **Numerous Probabilistic Distribution Models Such As Normal, LogNormal, Weibull etc. are available for Characterizing The Variations**



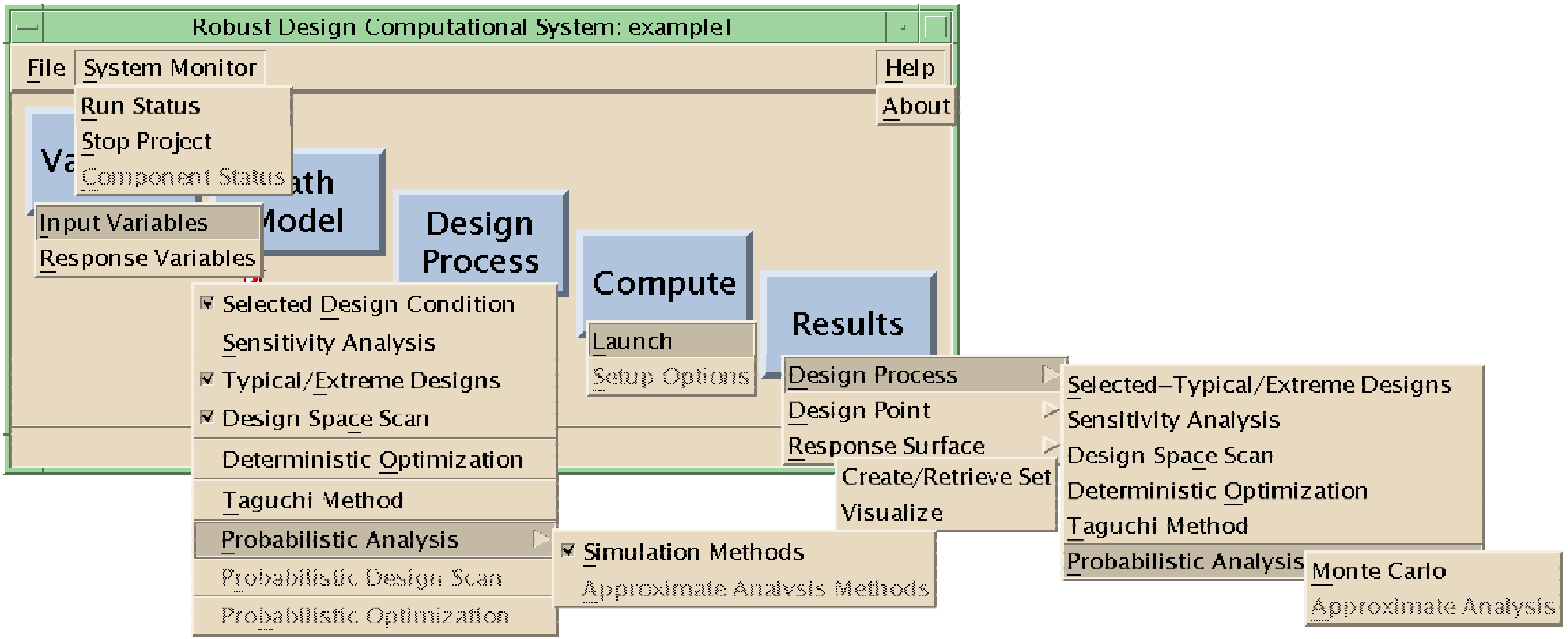


Graphical Definition of Multi-disciplinary Math Model

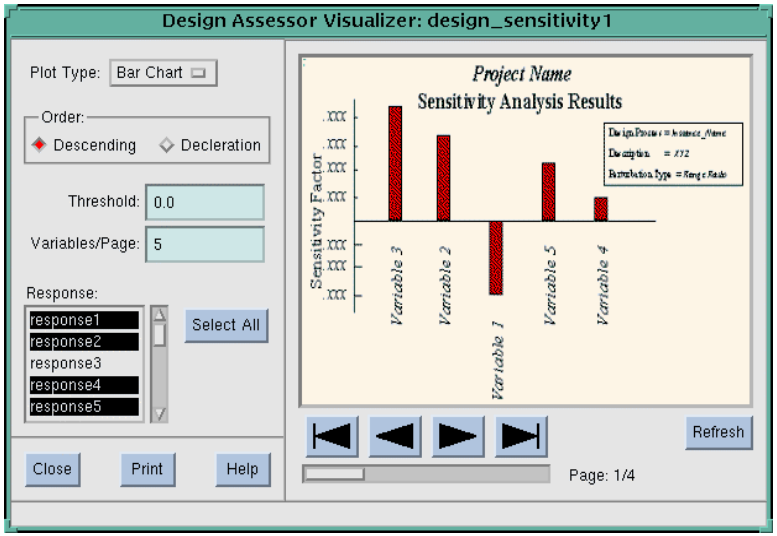


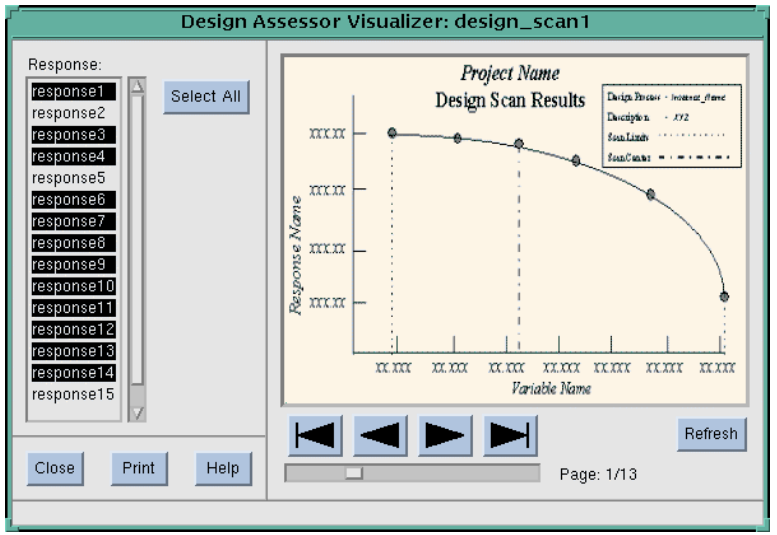
- **Customizable Service Pallet: Click and Drop Services**

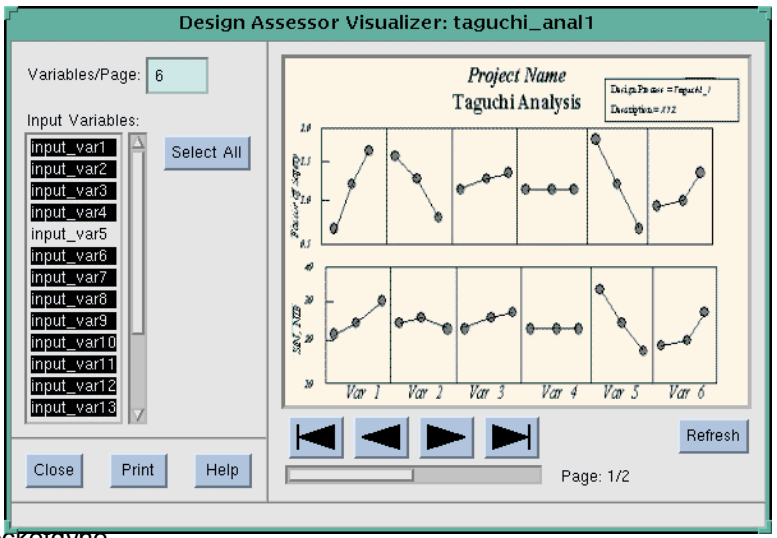
Design Process Selection

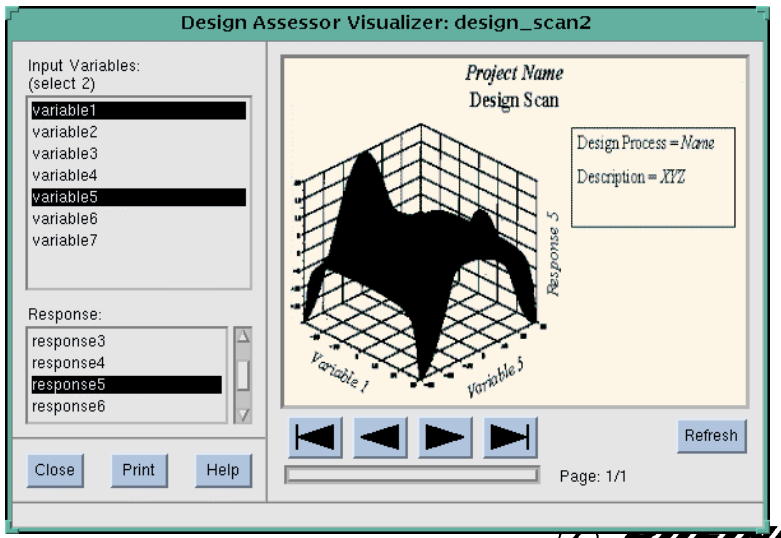


RDCS Design Visualization & Assessment



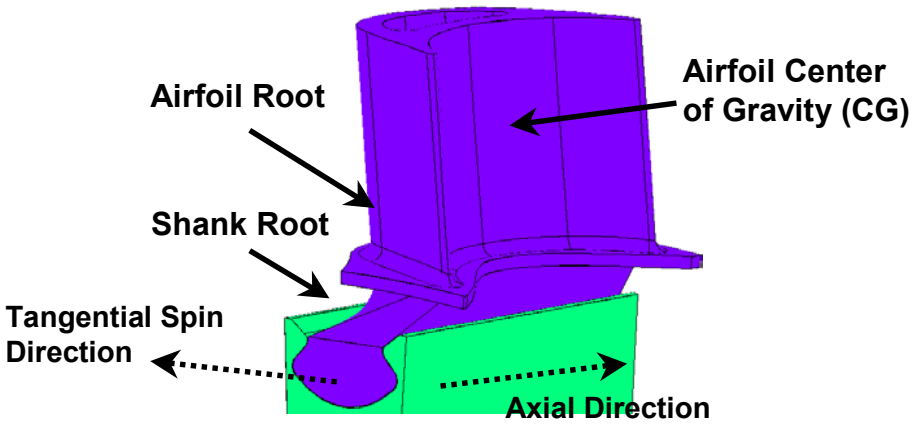




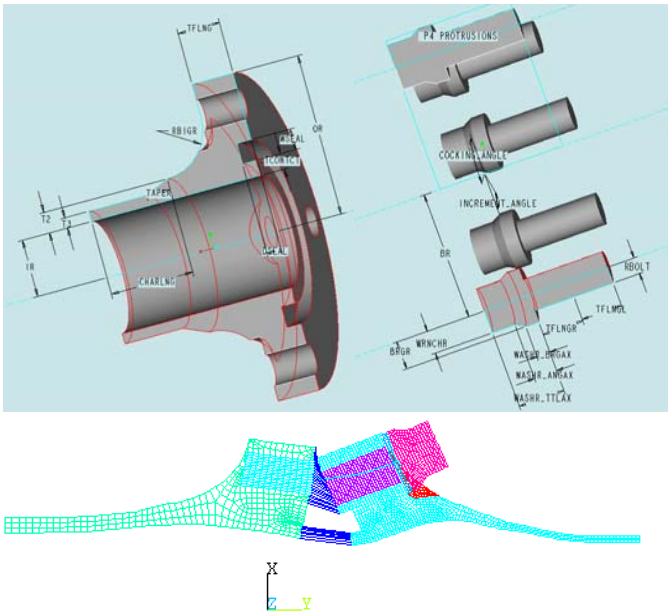


Applications Quantify Benefits of RDCS

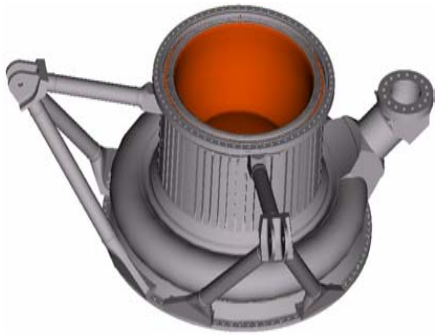
1000 NONLINEAR ANSYS RUNS TO BALANCE 6 TURBINE BLADE SETS -- 200 RUNS/NIGHT



CHANGE ROCKET ENGINE HIGH PRESSURE JOINT DESIGN FOR ELV USING OVER 120 3D NON-LINEAR FEM MODEL CONFIGURATIONS



10% WEIGHT SAVINGS FOR RS-68 MANIFOLD FLANGE



Software Architecture of RDCS
State Of The Art

- Graphical User Interface
  - Ease of Use
  - Minimal Training
- Client / Server
  - Distributed Computing
  - Major Cycle Time Improvement
  - Model for Internet/Intranet Operation
- Open Architecture
  - Adding New Design Processes
  - Permits Rapid Links To Other Codes
- Object Oriented Design
  - Ease of Maintenance
  - Reusability
  - Ease of Enhancement
- C++ Motif
  - Industry Standard
  - Supports Object Oriented Design